CLAIMS

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1. In a radiotelephone operable in a code division multiple access (CDMA) system, a method of acquiring a pilot signal, the method comprising:

storing samples of a received signal;

selecting a pseudo-random noise (PN) offset for a PN sequence;

correlating at least a portion of the samples with at least a portion of the PN sequence to produce a correlation energy;

choosing a new PN offset;

comparing the correlation energy to an energy threshold; and

repeating the steps of correlating, choosing, and comparing until any of:

a PN sequence timing is found that produces the correlation energy at least equal to the energy threshold, or

the step of comparing is performed a predetermined number of times.

2. The method as in claim 1 wherein the step of choosing is responsive to the step of correlating.

3. The method as in claim 2 further comprising:

generating, during the step of storing, the PN sequence; and

re-generating, during the step of correlating, the PN sequence with reference to the PN offset.

4. The method as in claim 3 wherein the step of re-generating is performed at a faster rate than the step of generating.

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5. The method as in claim 4 further comprising noting, during the step of storing, a position of the PN sequence.

6. The method as in claim 5 wherein the step of selecting is responsive to the step of noting.

7. The method as in claim 5 wherein the new PN offset is chosen with respect to the PN offset selected during the step of selecting.

8. The method as in claim 7 wherein the new PN offset represents an incremented version of the PN offset selected during the step of selecting.

9. A method of activating a radiotelephone operable in a code division multiple access (CDMA) system, the method comprising the steps of:

activating at least a portion of a searcher receiver;

initiating the generation of a pseudo-random noise (PN) sequence;

storing samples of a received signal;

noting, during the step of storing, a position of the PN sequence;

producing, responsive to the step of noting, a reference position of the PN sequence;

re-generating the PN sequence using the reference position;

correlating, during the step of re-generating, at least a portion of the samples with at least a portion of the PN sequence to produce a correlation energy;

incrementing, responsive to the step of re-generating, the reference position;

comparing the correlation energy to an energy threshold; and

repeating the steps of re-generating, correlating, incrementing, and comparing until any of:

a PN sequence timing is found that produces the correlation energy at least equal to the energy threshold, or

the step of comparing is performed a predetermined number of times.

10. The method as in claim 9 wherein the steps of storing, noting, and producing occur at a first rate, and the steps of re-generating, correlating, incrementing, and comparing occur at a second rate, the second rate faster than the first rate.

11. The method as in claim 10 further comprising:

ranking each of the correlation energies as they are produced; and

storing a predetermined number of highest correlation energies and the corresponding reference positions of the PN sequence.

12. The method as in claim 9 further comprising assigning, to at least one demodulation branch of a receiver of the radiotelephone, a PN sequence timing corresponding to the reference position that produces the correlation energy at least equal to the energy threshold.

13. In a code division multiple access (CDMA) radiotelephone, a method of acquiring a pilot signal, the method comprising:

storing a predetermined number of samples of a received signal;

generating a pseudo-random noise (PN) sequence at each of a plurality of different PN offsets;

correlating the predetermined number of samples with the PN sequence at each of the plurality of different PN offsets to produce corresponding correlation energies;

interrupting the correlating when a correlation energy at least equal to a predetermined threshold is produced; and

choosing a PN sequence timing based upon the PN sequence and a PN offset that produces a full correlation energy at least equal to the predetermined threshold.

14. The method as in claim 13 wherein the step of choosing is responsive to the step of interrupting.

15. The method as in claim 14 wherein the step of correlating comprises:

a first correlation involving a first portion of the samples and a first portion of the PN sequence; and

a second correlation involving a second portion of the samples and a second portion of the PN sequence,

wherein if during the step of correlating the first correlation produces an intermediate correlation energy less than an intermediate threshold for a particular PN offset, the second correlation at that particular PN offset is not performed.

16. The method as in claim 14 wherein the step of correlating occurs at a faster rate than the step of storing.

17. The method as in claim 16 further comprising assigning, responsive to the step of choosing, the PN sequence timing to at least one demodulation branch of a receiver of the radiotelephone.

18. An apparatus for acquiring a pseudo-random (PN) sequence timing for a code division multiple access (CDMA) radiotelephone, the apparatus comprising:

a buffer to store samples of a received signal;

a correlator coupled to the buffer and operable to correlate at least a portion of the samples with a PN sequence at each of a plurality of different PN offsets to produce corresponding correlation energies; and

a controller coupled to the correlator and operable to interrupt the correlator when the PN sequence at a particular PN offset produces a correlation energy at least equal to an energy threshold.

19. The apparatus as in claim 18 wherein the controller comprises any of a microprocessor, a digital signal processor (DSP), and logic circuitry.

20. The apparatus as in claim 18 further comprising a memory coupled to the correlator for storing a predetermined number of highest correlation energies and corresponding PN offsets.

21. The apparatus as in claim 20 wherein if after a predetermined number of correlations none of the produced correlation energies at least equal the energy threshold, the controller chooses from the memory a PN offset corresponding to a highest correlation energy.

22. The apparatus as in claim 18 further comprising a latch coupled to an output of the correlator and operable, at each of the plurality of different PN offsets, to latch an intermediate correlation result after correlation over a first number of the samples and operable to latch a second correlation result after correlation over a second number of the samples.

23. The apparatus as in claim 18 further comprising a PN sequence generator coupled to the buffer and the correlator to generate the PN sequence at each of the plurality of different PN offsets.

24. The apparatus as in claim 23 wherein the PN sequence generator comprises a first PN generator and a second PN generator, the first PN generator operable to generate a PN sequence at a first rate to store the samples in the buffer, the second PN generator operable to generate the PN sequence at each of the plurality of different PN offsets at a second rate, the second rate faster than the first rate.

25. A code division multiple access (CDMA) cellular telephone system comprising:

at least one base station for transmitting a pilot signal having a particular time alignment;

a cellular telephone operable to receive representations of the pilot signal, the cellular telephone including:

a buffer to store samples of the representations of the pilot signal;

a correlator coupled to the buffer and operable to correlate at least a portion of the samples with a pseudo-random noise (PN) sequence at each of a plurality of different PN offsets to produce corresponding correlation energies; and

a controller coupled to the correlator and operable to interrupt the correlator when the PN sequence at a particular PN offset produces a correlation energy at least equal to an energy threshold.

26. The CDMA cellular telephone system as in claim 25 wherein the controller comprises any of a microprocessor, a digital signal processor (DSP), and logic circuitry.

27. The CDMA cellular telephone system as in claim 25 further comprising a memory coupled to the correlator for storing a predetermined number of highest correlation energies and corresponding PN offsets.

28. The CDMA cellular telephone system as in claim 27 wherein if after a predetermined number of correlations none of the produced correlation energies at least equal the energy threshold, the controller chooses from the memory a PN offset corresponding to a highest correlation energy.

29. The CDMA cellular telephone system as in claim 25 further comprising a latch coupled to an output of the correlator and operable, at each of the plurality of different PN offsets, to latch an intermediate correlation result after correlation over a first number of the samples and operable to latch a second correlation result after correlation over a second number of the samples..

30. The CDMA cellular telephone system as in claim 25 further comprising a PN sequence generator coupled to the buffer and the correlator to generate the PN sequence at each of the plurality of different PN offsets.

31. The CDMA cellular telephone system as in claim 30 wherein the PN sequence generator comprises a first PN generator and a second PN generator, the first PN generator operable to generate a PN sequence at a first rate to store the samples in the buffer, the second PN generator operable to generate the PN sequence at each of the plurality of different PN offsets at a second rate, the second rate faster than the first rate.

32. A method of activating a code division multiple access (CDMA) cellular telephone, the method comprising:

turning on the cellular telephone;

activating a searcher receiver;

receiving representations of a pilot signal;

generating a pseudo-random noise (PN) sequence;

storing, during the step of generating, digital samples of the representations of the pilot signal;

re-generating the PN sequence at each of a plurality of PN offsets;

correlating the digital samples with the PN sequence at each of the plurality of PN offsets to produce corresponding single correlation energies;

storing a predetermined number of highest single correlation energies and corresponding PN offsets;

comparing after each correlation each of the single correlation energies to an energy threshold;

suspending the step of correlating responsive to finding a particular PN offset producing a single correlation energy at least equal to the energy threshold and using the particular PN offset as a PN sequence timing of a demodulation branch in a receiver of the cellular telephone; and

if, after the step of correlating is performed a predetermined number of times without producing the single correlation energy at least equal to the energy threshold, then choosing a PN offset corresponding to a highest stored single correlation energy for the PN sequence timing.

33. In a radiotelephone operable in a code division multiple access (CDMA) system, a method of acquiring a pilot signal, the method comprising:

(a) generating a pseudo-random noise (PN) sequence at a first rate;

(b) storing samples of a received signal at the first rate;

(c) noting, during the step of storing, a reference position of the PN sequence;

(d) storing the reference position;

(e) re-generating at a second rate the PN sequence starting from the reference position, the second rate faster than the first rate;

(f) correlating, during the step or re-generating, at least a portion of the samples with at least a portion of the PN sequence to produce a correlation energy;

(g) selecting, responsive to the step of re-generating, a new reference position;

(h) comparing the correlation energy to an energy threshold; and

(i) repeating steps (e) through (h) until any of:

a correlation results in the correlation energy at least equal to the energy threshold, wherein a reference position corresponding to the correlation energy at least equal to the energy threshold is assigned to at least one demodulation branch of a receiver of the radiotelephone, or

the step of comparing is performed a predetermined number of times, wherein a reference position corresponding to a highest correlation energy is assigned to the at least one demodulation branch.

34. In a radiotelephone operable in a code division multiple access (CDMA) telephone system, a receiver circuit for acquiring a pseudo-random noise (PN) sequence timing, the receiver circuit comprising:

a buffer to store samples of representations of at least one pilot signal;

a first PN generator coupled to the buffer to produce a PN sequence at a first rate;

a second PN generator coupled to the buffer to produce the PN sequence at a plurality of PN offsets at a second rate, the second rate faster than the first rate;

a correlator coupled to the buffer and operable to correlate at least a portion of the samples with the PN sequence at each of the plurality of PN offsets to produce a correlation energy for each correlation;

a comparator coupled to the correlator to compare each of the correlation energies to an energy threshold; and

an energy post-processor coupled to the comparator and operable to note a highest correlation energy;

wherein responsive to a particular PN offset resulting in a correlation energy at least equal to an energy threshold, the correlator suspends correlating and the particular PN offset is useful as a PN sequence timing, and

wherein responsive to the correlator performing a predetermined number of correlations and none of the plurality of PN offsets results in the correlation energy at least equal to the energy threshold, a PN offset corresponding to the highest correlation energy is selected as the PN sequence timing.